

**REMARKS**

As of the filing of the present reply, claims 1-25 were pending in the above-identified US Patent Application.

In the Office Action, the Examiner rejected claim 14 under 35 USC §112, second paragraph, rejected claims 1-25 under the judicially-created doctrine of obviousness-type double patenting, and rejected claims 1-25 under 35 USC §102 or §103. In the present reply, Applicants have amended the claims as set forth above. More particularly:

Independent claims 1, 11, and 21 have been amended to recite that the pores (32) establish an open porosity within the thermal barrier coating (26), and to require the further step of partially sintering the thermal barrier coating (26) to close at least some of the pores (32) and entrap the elemental carbon and/or the insoluble gas within the closed pores (32). Support for these amendments can be found in Applicants' specification at paragraphs [0011] and [0022] and original dependent claims 4, 7, 14, and 16.<sup>1</sup>

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<sup>1</sup> All references to paragraphs in Applicant's electronically-filed application are those inserted by Applicants, and not by the USPTO authoring software.

Dependent claim 2 has been amended to require the presence of elemental carbon within the pores (32). Support for this amendment can be found in Applicants' specification at paragraphs [0011].

Independent claim 11 has been further amended to require that partial sintering of the thermal barrier coating (26) evolves a carbon-containing gas from at least some of the elemental carbon deposited in the pores (32). Support for this amendment can be found in Applicants' specification at paragraph [0022] and original dependent claims 16 and 18.

Independent claim 21 has been further amended to require that the infiltration step is by vacuum infiltration. Support for this amendment can be found in Applicants' specification at paragraph [0026].

Dependent claims 4, 7, 8, 14, 15, 17-19, and 24 have been amended and dependent claim 16 has been canceled in view of the amendments to their respective parent claims 1, 11, and 21.

Applicants believe that the above amendments do not present new matter. Favorable reconsideration and allowance of remaining claims 1-15 and 17-25 are respectfully requested in view of the above amendments and the following remarks.

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**Rejection under 35 USC §112**

The rejection of dependent claim 14 is believed to be overcome in view of the cancellation of the language found to be indefinite by the Examiner.

**Double Patenting Rejection**

The rejection of remaining claims 1-15 and 17-25 under the judicially-created doctrine of obviousness-type double patenting based on commonly-assigned U.S. Patent No. 7,087,266 to Darolia et al. is believed to be overcome in view of the attached Terminal Disclaimer.

**Rejection under 35 USC §102 based on Rigney**

Independent claims 1, 11, and 21 and their dependent claims 2, 4-10, 20, and 22-25 were rejected under 35 USC §102(e) in view of U.S. Patent No. 6,492,038 to Rigney et al. (Rigney). As currently amended, each of the independent claims require a sintering step that was originally recited in dependent claims 7 and 16, of which only claim 7 was subject to the §102(e) rejection based on Rigney. In the discussion directed to claim 7, the Office Action states that Rigney discloses stabilization of a TBC microstructure with

fine precipitates that anchor and pin grain boundaries and pores of the TBC,

thus preventing grain growth and pore redistribution from sintering/high temperature usage (i.e. at least some of the pores entrap the insoluble gases) (col. 4, lines 57-65).

Additionally, the TBC-coated substrate is subject to a heat treatment in the presence of a carbon and/or nitrogen containing gas.

However, Rigney's "coating and method are particularly directed to inhibiting ... sintering ... in the TBC during high temperature excursions." (Emphasis added.) Column 2, lines 11-14. See also column 2, lines 64-66, and particularly column 3, lines 23-27:

By sufficiently stabilizing the TBC microstructure and pinning grain boundaries with carbide and/or nitride precipitates, the component can be subsequently heated to temperatures in excess of 1200°C *without causing sintering* .... (Emphasis added.)

In other words, Rigney's process clearly does not involve sintering. Applicants therefore respectfully request withdrawal of the rejection under 35 USC §102(e) based on Rigney.

**Rejections under 35 USC §103 based on Rigney**

In view of the above arguments concerning the §102 rejection based

on Rigney, Applicants believe that the §103 rejections based on Rigney are also overcome, as none of the secondary references (Wortman and Maloney) disclose or suggest intentionally sintering a porous TBC to entrap a gas.

Furthermore, rejections based on a §102(e) reference with a common inventor can be overcome by, among others, a showing that the subject matter of the application and the reference were, at the time the invention was made, commonly-owned or subject to an obligation of assignment to the same entity (MPEP 706.02(l)). The undersigned hereby affirms that, at the time Applicants' invention was made, the inventors identified in the present application and in Rigney were subject to an obligation of assignment to the same entity, namely, the General Electric Company, as evidenced by the recorded Assignments to General Electric Company for both patent applications.

In view of the above, Applicants respectfully request withdrawal of the rejections under 35 USC §103 based on Rigney.

**Rejection under 35 USC §102 based on Alperine**

Independent claims 1, 11, and 21 and their dependent claims 2, 4-10, and 22-25 were rejected under 35 USC §102(b) in view of U.S. Patent No. 6,312,832 to Alperine et al. (Alperine). As noted above, each of the independent claims have been amended to require a sintering step that was originally recited in dependent claims 7 and 16, of which only claim 7 was subject to the §103 rejection based on Alperine. Under the rejection, Alperine was said to disclose

Additionally, carbon is introduced in small quantities . . . to reduce the thermal conductivity of the coating (i.e. present in an amount sufficient to thermally stabilize the microstructure of the thermal insulating material) (col. 4, lines 6-20).

However, the cited passage from Alperine (column 4, lines 6-20) discloses nothing regarding thermally stabilizing the microstructure of a thermal insulating material.

While Alperine teaches that carbon-based gases may be trapped in the TBC, Alperine's intent is to react carbon to form metal oxides (column 4, lines 6-15) and does not perform a sintering operation to intentionally increase

the entrapment of carbon-based gases produced as a byproduct of the metal-carbon reaction.

In the discussion directed to claim 7, the Office Action cited a heat treatment performed by Alperine at column 5, lines 44-51. However, this treatment was performed to study the "influence of high-temperature aging of the coatings on their conductivity ... to ensure that the conductivity values are permanent when the coated articles are operated at high temperature." In other words, the step was merely performed to show that the coatings would not undergo any changes. Therefore, Alperine's study was merely for the limited purpose of evaluation, and not a step in the production of a TBC coating.

Furthermore, Alperine's study was performed on TBC that did not contain carbon. Therefore, Alperine does not disclose or suggest any process by which sintering was used to not only close porosity within the TBC, but also trap carbon-based gases that were intentionally infiltrated prior to sintering or that were intentionally evolved during sintering.

In view of the above, Applicants believe that Alperine does not disclose or suggest their claimed method, and respectfully request withdrawal of the §102 rejection based on Alperine.

**Rejections under 35 USC §103 based on Alperine**

In view of the above arguments concerning the §102 rejection based on Alperine, Applicants believe that the §103 rejections based on Alperine are also overcome, as none of the secondary references (Wortman, Maloney, Strangman et al., or Turpin et al.) disclose or suggest intentionally sintering a porous TBC. Therefore, Applicants respectfully request withdrawal of the rejections under 35 USC §103 based on Alperine.

**Closing**

In view of the above, Applicants believe that all issues outstanding from the Office Action have been addressed, and that the claims define patentable novelty over all the references, alone or in combination, of record. It is therefore respectfully requested that this patent application be given favorable reconsideration.

Though the above remarks are primarily limited to certain limitations of the claims, Applicants believe that other limitations of the claims provide additional grounds of patentability over the cited references, and Applicants reserve the right to present these additional grounds at a later time if

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necessary.

Should the Examiner have any questions with respect to any matter now of record, Applicants' representative may be reached at (219) 462-4999.

Respectfully submitted,



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Attachment: Terminal Disclaimer